

## Scaling Up Rural Sanitation

# A Randomized Controlled Study of a Large-Scale Rural Sanitation Behavior Change Program in Madhya Pradesh, India

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This research brief provides background on the consequences of fecal contamination in household environments in rural communities in India, describes the Total Sanitation Campaign (TSC) strategy to drive sanitation access and behavior change to improve child health outcomes, and summarizes the results of the evaluation of these efforts in Madhya Pradesh.

**Open defecation is a major cause of preventable disease, and it is an especially acute problem in India.** The latest estimates indicate that by the end of 2012, approximately 36 percent of the world's population did not have access to improved sanitation facilities, which are designed to prevent human feces from re-entering the environment. In India, approximately 800 million people do not have access to improved sanitation, accounting for about one third of the global total. Of these, approximately 600 million people defecate in the open, which accounts for nearly 60 percent of the practice worldwide.<sup>1</sup> In Madhya Pradesh, home to 72.6 million people—72 percent of whom live in rural areas—86 percent of the population practice open defecation. The high prevalence of open defecation in India leads to millions of preventable deaths yearly from diarrheal disease.

**The Government of India launched the TSC in 1999 with the goal of achieving universal rural sanitation by 2012.** The TSC utilized the principles of a demand-driven and community-led approach to sanitation, in which external facilitators lead sessions designed to empower the community to change its sanitation behavior, change norms and behaviors around open defecation, and mobilize the building of toilets with designs that incorporate low cost and locally available materials. The TSC was characterized by a focus on demand generation, a shift

## SUMMARY OF KEY FINDINGS

An evaluation of the State of Madhya Pradesh's implementation of the Government of India's Total Sanitation Campaign (TSC), using a sample of villages in two districts, revealed several program impacts:

- Toilet coverage<sup>2</sup> rose 19 percentage points to 41 percent in intervention villages compared with 22 percent in control villages.
- Self-reported open defecation among adults declined 10 percentage points to 74 percent in intervention villages compared with 84 percent in control villages.
- There were some improvements in water quality and reduction in parasitic infection among children, but no consistent improvements in child health outcomes in intervention areas compared with control areas.
- Some child health benefits may require more time to materialize and capture, given that in many villages implementation had only recently been completed by the time of the survey.

from high-subsidy to low-subsidy regimes,<sup>3</sup> and a prize for communities that achieved open defecation free (ODF)

<sup>2</sup> As measured by the WHO-UNICEF Joint Monitoring Programme (JMP) definition of access to improved sanitation, regardless of use.

<sup>3</sup> In Madhya Pradesh, TSC, along with a concurrent program, *Nirmal Vatika*, together provided at least Rs 4,200 (US \$80) to Below Poverty Line (BPL) households and at least Rs 2,000 (US \$40) to non-BPL households to support toilet construction, amounts deemed to be adequate to construct a single toilet.

<sup>1</sup> WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. 2014. *Progress on Drinking Water and Sanitation: 2014 Update*. Geneva: WHO Press.

status.<sup>4</sup> The TSC provided a broad financial, policy, and institutional framework for sanitation improvement in India, but allowed individual states and districts to develop strategies and intervention methodologies according to their specific needs and priorities. In Madhya Pradesh, the campaign focused on accelerating sanitation coverage in rural areas. As such, the government supplemented the incentive available under the TSC for families living below the poverty line. It also provided an incentive to families that were not eligible for TSC through convergence with the National Rural Employment Guarantee Act or cash-for-work program.

In 2006, the World Bank's Water and Sanitation Program (WSP) launched the Scaling Up Rural Sanitation program to support national and local governments to improve sanitation coverage at scale. In India, WSP supported efforts in rural Madhya Pradesh and Himachal Pradesh to strengthen TSC implementation by building capacity of local government entities, supporting the development of behavior change strategies, facilitating the design of incentives to achieve sustainable outcomes, promoting evidence-based policies and good practices, and strengthening monitoring and evaluation systems.

## IMPACT EVALUATION

**To understand the effectiveness of the sanitation program as implemented in Madhya Pradesh,** WSP conducted a randomized controlled trial in the Dhar and Khargone districts of Madhya Pradesh. Within these two districts, the study used a public lottery to assign 80 villages with similar characteristics to either the “intervention” group (villages that received TSC activities) or the “control” group (villages that did not receive TSC activities until after the evaluation). In each village, 25 households with at least one child under the age of one were chosen to participate in the study. To identify how the TSC program as implemented in Madhya Pradesh impacted household behavior and child health outcomes, the study tracked and compared responses from household surveys and child characteristics in intervention and control areas at the start of the program and again 21 months later.

<sup>4</sup> ODF status is achieved after 100 percent of a community's population gains access to a private or shared toilet, and the community meets all other total sanitation requirements outlined in the Nirmal Gram Puraskar (Clean Village Prize) guidelines published by the Government of India: [http://mdws.gov.in/sites/upload\\_files/ddws/files/pdf/NGP\\_Guidelines2012-ENG\\_0.pdf](http://mdws.gov.in/sites/upload_files/ddws/files/pdf/NGP_Guidelines2012-ENG_0.pdf).

## **The evaluation measured the impact of Madhya Pradesh's TSC using a variety of methods throughout the hypothesized pathway of change.**

The TSC's theorized causal chain leading to improvements in child health is outlined in Figure 1. Specific benchmarks of progress evaluated along this intended path of change include measuring access to improved sanitation, prevalence of open defecation, prevalence of feces in the living environment, fecal contamination of both source and drinking water, rates of diarrhea and infection, and finally, child health outcomes. To measure these outcomes, researchers used questionnaires at the household, community, and administrative levels; caregiver reports of diarrhea; anthropometric measures such as child height, weight, and mid-upper arm circumference; anemia testing with blood samples; and water and stool samples.

The initial survey for the evaluation took place in the selected districts between May and July 2009, and the follow-up survey was conducted between February and April 2011. Figure 2 shows the main findings of the evaluation.

## **Because implementation in the intervention areas experienced delays, the period of exposure to TSC activities in the intervention group was shorter than expected.**

At the time of the follow-up survey, among households in the study, only 14 of 40 intervention villages had more than six months of exposure to program activities. Full implementation of the program in the selected villages was envisioned to take place within 18 months of the baseline survey. However, in practice, by the time of the follow-up survey, 21 months after the initial data collection, the implementation was a few months behind schedule. The limited exposure period in the intervention villages was likely to have been too short to result in impacts on distant outcomes such as child health.

## KEY FINDINGS

### **Despite incomplete implementation of activities within the evaluation timeline, Madhya Pradesh's TSC led to increased toilet coverage and use in intervention villages.**

At endline, households in intervention villages had higher access to improved sanitation than their control village counterparts (41 percent for intervention compared to 22 percent for control) and showed higher levels of use (as assessed by the surveyor's observations of the facility), although to a lesser extent than the increase in access to toilets.

Figure 1: Theory of Change and Evaluation Measures of the Total Sanitation Campaign

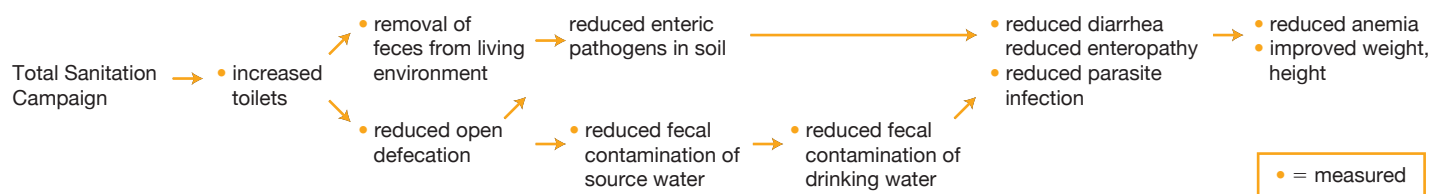
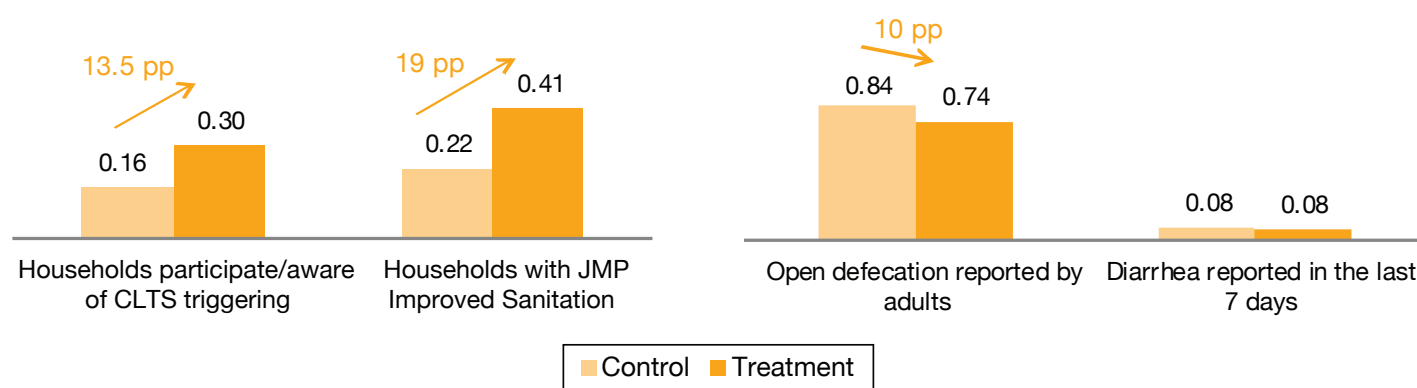


Figure 2: Key Findings of the Madhya Pradesh Total Sanitation Campaign Evaluation



**Madhya Pradesh's TSC also led to improvements in sanitation behaviors.** Among all adults in the intervention group, self-reported open defecation was 10 percentage points lower than open defecation in the control group counterparts. At the time of the endline survey, 74 percent of men in the TSC intervention group reported defecating in the open compared to 84 percent of men in the control group. For women a similar decrease occurred, with 83 percent in the control group reporting open defecation at endline compared to 73 percent in the intervention group. Reportedly, safe disposal of child feces<sup>5</sup> was 9 percentage points higher in the intervention group (27 percent for intervention group versus 18 percent for control group).

**Madhya Pradesh TSC increased toilet construction and induced positive changes in sanitation behavior particularly among women in households without a toilet at baseline and households that were below the poverty line.** Impacts on toilet coverage and sanitation-related behavior were concentrated almost entirely among households without a toilet at baseline and households that were classified as Below Poverty Line (BPL) and as such,

received more financial support. Households classified as BPL in intervention villages showed higher access to improved sanitation (49 percent had access in intervention villages compared to 17 percent in control villages), and TSC reduced self-reported open defecation among women in BPL households by 21 percentage points (71 percent for treatment versus 92 percent in the control group).

**Water quality improved slightly in the intervention villages.** Among the study's population overall, drinking water quality was poor. At endline, 82 percent of household drinking water samples from control villages tested positive for *E. coli*; water quality was slightly improved in intervention households, where 77 percent of samples tested positive for *E. coli*, a statistically significant reduction of 5 percentage points. The reduced level of *E. coli* in intervention household drinking water suggests the TSC program might have reduced waterborne transmission of this pathogen in intervention villages.

**Some parasitic infection rates decreased in intervention villages, but no significant improvements in child health were detected.** Children in intervention villages had lower prevalence of *Giardia lamblia* than children in the control villages (4.8 percentage points). However, the

<sup>5</sup> Safe disposal as defined by the WHO-UNICEF Joint Monitoring Programme (JMP).

reduction is only significant among intervention households that already had toilets at baseline. Differences in prevalence for other parasitic infections did not prove statistically significant. For example, prevalence of *Ascaris* infections remained static, suggesting the program did not successfully reduce pathogen transmission to children through soil as it appeared to for waterborne transmission. Ultimately, no significant improvements in child health resulted from the program. Rates of diarrhea, determined by caregiver reports of child symptoms, did not differ between intervention and control groups (8 percent of children in each group were reported to have diarrhea symptoms in the previous 7 days), and acute respiratory illness was more prevalent in the intervention group than in the control group (17 percent versus 13 percent). No program impact was found related to rates of anemia or anthropomorphic measures such as child height or weight.

## LOOKING FORWARD

Although no improvements in child health were detected, this evaluation revealed

encouraging results for expanding access to toilets: India's TSC program in Madhya Pradesh was effective in promoting improved toilet construction in rural Indian households, and access to improved toilets resulted in lower levels of open defecation, although it far from eliminated it.

Subsidies were followed by increased toilet construction, and BPL households proved especially responsive. Yet, rates of open defecation remained high. Toilet use lags behind toilet construction, and room for improvement exists for changing sanitation behaviors. This suggests that subsidies likely accelerate toilet construction, but are insufficient to guarantee use, possibly demonstrating the need for more robust behavior change components of similar interventions in the future.

Lastly, given the large improvements in toilet construction, an additional child health follow-up survey in the study villages could yield valuable information on health improvements realized over a longer period of exposure to improved sanitation conditions.

The Water and Sanitation Program is a multi-donor partnership, part of the World Bank Group's Water Global Practice, supporting poor people in obtaining affordable, safe, and sustainable access to water and sanitation services. WSP's donors include Australia, Austria, Denmark, Finland, France, the Bill & Melinda Gates Foundation, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States, and the World Bank.

The findings, interpretations, and conclusions expressed herein are entirely those of the author and should not be attributed to the World Bank or its affiliated organizations, or to members of the Board of Executive Directors of the World Bank or the governments they represent.

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## Full Report

This research brief was prepared by Bertha Briceño and Jeffrey Eisenbraun. It summarizes the full report, *A Randomized, Controlled Study of a Rural Sanitation Behavior Change Program in Madhya Pradesh, India*, World Bank Policy Research Working Paper No. 6702, available at <http://documents.worldbank.org>.

## About the program

Today, 2.5 billion people live without access to improved sanitation. Of these, 71 percent live in rural communities. To address this challenge, WSP is working with governments and local private sectors to build capacity and strengthen performance monitoring, policy, financing, and other components needed to develop and institutionalize large-scale, sustainable rural sanitation programs. With a focus on building a rigorous evidence base to support replication, WSP combines Community-Led Total Sanitation, behavior change communication, and sanitation marketing to generate sanitation demand and strengthen the supply of sanitation products and services, leading to improved health for people in rural areas. For more information, please visit <http://www.wsp.org/scalingupsanitation>.

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